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Building Maintenance Management System for Heritage Museum

An investment in the building maintenance aspect is massive throughout the world. In most of the countries, it signifies approximately 50% of the entire revenue of the construction industry. The value of buildings depends on the eminence of the maintenance invested in them. Maintenance management engages obtaining utmost advantage from the investment made on the maintenance activities. At the moment, maintenance in buildings in Malaysia is on the increase in spite of size, category, location, and ownership. This study focuses on Building Maintenance Management System for Heritage Museum, which consists of two case studies in Penang State Museum and Art Gallery, Malaysia and Museum of Perak, Malaysia. The aim of this study is to propose methods to improve the maintenance management system for heritage museum. From the results, the common problem occurs during the implementation for the maintenance of each building is the budget for the maintenance and worker's skill. The department of each museum must have their own maintenance unit to keep an eye on the maintenance activities for their buildings in order to improve the maintenance management system in their building.

Keywords: maintenance management, heritage building, museum, art gallery

1. Introduction

Maintenance for building can be defined as the process which the building is kept usable at a pre-determined standard for the use and benefit of its occupants or user. Building maintenance has become the significant part of the work for the building in order to keep the buildings usable for the heritage museum building [1]. The maintenance management is defined as systematic approach in planning, organizing, monitoring and evaluating maintenance activities and their costs. A good maintenance management system could prevent the heritage museum from

damage and can reduce the operating cost and at the same time can sustain the particular building for longer life span. In addition, maintenance management system also can influence the effectiveness of the process of maintenance system to keep the building usable [2].

In Malaysia, the aspect of building maintenance is provisionally determined and is regularly carried out only when there is money, even if the needs are understandable the building becomes unpleasant or even inappropriate for its users and the public [3]. Per se, aspect of building maintenance is not regarded as part of the production processes, that is, not as a factor of production[4]. There is no hesitation that the government is constantly increasing its provision to the maintenance division, but the allocation is abominably insufficient to meet the ever-growing command for the maintenance accumulation [5]. For that reason, there is a call for a broad and efficient value-based *modus operandi* associated to building maintenance that puts the building users at the centre of maintenance planning, control, and execution [6]. A proper building maintenance management system that is value based offers an apparent characterization of the ambitions and objectives of the maintenance programmes and policies as well as creating the problems the maintenance is expected to resolve [7].

Undoubtedly, the building maintenance accumulation will carry on to amplify, as buildings necessitate maintenance to be serviceable and well-designed [16]. All the buildings entail efficient maintenance aspect; or else they turn out to be a trouble to the clients, users, and the members of public. Aspects of maintenance cannot be avoided, but can be enhanced proactively [17]. Consequently, owing to the accumulation of numerous years of building maintenance, there is an insistent need to progress the ways building maintenance management is implemented in Malaysia or else, a widespread enhance in investment is expected to be required in the very near future to resolve defect, decay, and worsening, which will, by then, be much more severe [18]. In addition, this is tied with the dejected level of recent expenditure on building maintenance aspects and the disregard of several of the works that necessitate maintenance.

The purpose of this paper is to look at the maintenance and maintenance management of heritage buildings in Malaysia and to propose methods to perk up the maintenance management system for heritage museum in order to improve the value of buildings through a proactive maintenance management system that is based on the concept of value. Even though this paper presents as a general inspiration of continuing research, it aims to institute the validation for further research towards the development of a value-based building maintenance management system to improve the value of heritage buildings in Malaysia.

2. Methodology

Present heritage building maintenance management practices in Malaysia are, however, condition and reactive based. The rising importance of building maintenance

nance has also engendered an increasing attention in developing maintenance management procedures to progress the performance of heritage buildings in Malaysia. In order to carry out this study, there are several research methodologies applied, including the literature review, data collection, site visit, interviews, observation and data analysis.

3. Observation, Result and Discussion

i. Case Study 1: Penang State Museum and Art Gallery

Penang State Museum and Art Gallery is located in Farquhar Street is under management of Penang State Government, Malaysia. This management team is responsible party that will manage this building and to ensure that this heritage building is in good condition for longer life span. If there is any problem in the aspect of maintenance and the building needs to be repaired, they will appoint related contractor to repair this historic building through tendering process. Then, the selected contractor will commence their work to repair the building following the maintenance guideline for heritage building so that it will not fade the historical value to the structure and the material of the building.

On the other hand, maintenance budget is the cost based on labour, equipment, material and other item that is required in order to improve the maintenance for museum building. Usually if there are any problem towards the maintenance of the building that need to be repaired, the assistant curator that is responsible to monitor the structure condition of the museum will make the application form to apply some allocation to sort the problem out. Each maintenance work that needs to be repaired should get the improvable from the director or curator to apply for the budget. They need to apply the money from the Unit Perancangan Ekonomi Negeri (UPEN). The budget for repairing the maintenance is not provided for certain amount but if there is maintenance problem, so the budget will be applied to the UPEN according to the situation and condition of the building. Every worker for administration in this Penang State Museum and Art Gallery has the qualification with their own position and scope of work but they are not very skilled in maintenance of the building. The staff that only need to focus on maintenance and management for this museum is the only the assistant curator but the assistant curator also has many scope of work that they need to focus during office hour.

The lack of technical team for the maintenance of the building make the maintenance work will be postponed and will not efficient. Many of the staffs focus on their own scope of work such as safety and security, administration, and other task that is not related to the maintenance of the building. According to the observation, there are many maintenance problems for this museum because the maintenance work is postponed because of the lack of money and administration problem. There are several defects obtained from the observation for this building

which is not repaired and abandoned. There defects are the plaster loose problem, concrete spalling, fungus and moss growth, cracked, and painting problem. From figure 1 and figure 2 below, there are problems of plaster loose in the external and internal column section of the building. Figure 3 shows that the problem of peeling painting and figure 4 demonstrates some minor sracks that took place at internal part of the building.



Figure 1. Loose plaster at the external column section

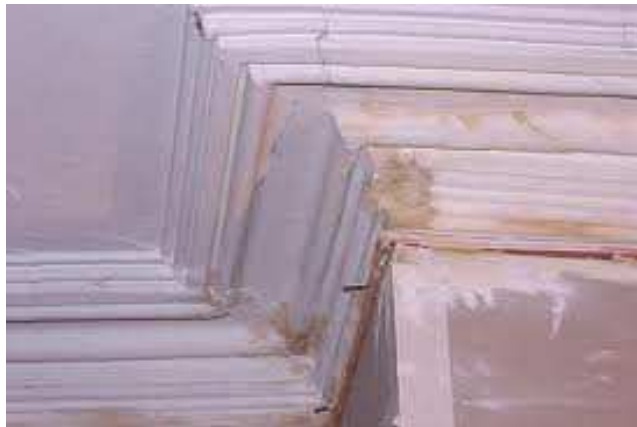


Figure 2. Loose plaster at the internal column section



Figure 3. Paint peeling problem occurred at external section of the building

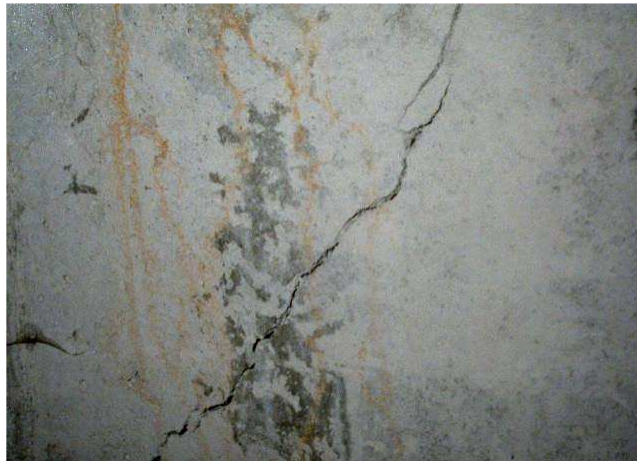


Figure 4. Minor cracks happened at internal section of the building

Overall, the level of maintenance management system for this building can be improved in the future. This is because; lack of staff that really compatible with the maintenance work will make the building not effective in terms of building condition and overall performance

ii. Case study 2: Museum of Perak

Museum of Perak is the oldest museum located in Taiping Perak, Malaysia. It is one of the historical buildings that very well known in Perak. The Museum of Perak is under the responsibility of Department of Museum Malaysia administration

but this museum also has the own administration. This Museum is under the federal government. Although this museum owned by the federal government, but it is fully under responsible of the Department of Museum Malaysia. The Department of Museum Malaysia is responsible to place their staff that is available to control and manage of this museum. Each maintenance work that has been done, it must follow the maintenance guideline from Department of Heritage Malaysia because this building has been classified as a heritage building in Malaysia.

According to the interview for this building, the staff from administration that is responsible for monitoring the maintenance problem for this building is the assistant curator museum. The assistant curator for this museum is not only focusing on the maintenance problem but this person must monitor and do the other job. In this museum there is no technical team that can handle the maintenance work if there is maintenance problem. So if there is maintenance problem in the museum, first the assistant curator will determine the problem of maintenance either the problem is small or serious problem. Then this person in charge will determine if this maintenance problem can give impact to the building or just a small problem. After that, if this problem is small and do not give bad effect to the building, then maintenance work will be postponed. However, if the case the problem of maintenance is serious and can give effect to the workers and building occupants the maintenance work need to be done and repaired as soon as possible, the administration of this museum will open the tender. Then, the administration will choose the best contractor to do this job for maintenance work and the selected contractor will do the maintenance work so that the serious case of maintenance problem can be solved.



Figure 5. Sign of leakage in the ceiling

Every staff working in Perak Museum has the qualification with their own position and scope of work but they are not very skilled in maintenance of the building. The staff that only need to focus on maintenance and management for this museum is the only the assistant curator but the assistant curator also has many scope of work. This means that the assistant curator also has to focus on the other scope of work rather than the maintenance problem in the museum. The lack of technical team for the maintenance of the building make the maintenance work will be postponed and will not efficient. Many of the staffs focus on their own scope of work such as safety and security, administration, and other task that is not related to the maintenance of the building.

According to the observation, there are several problems of maintenance in this building especially the defects about sign of leaking in the ceiling. The other defects are not very serious to the building. Figure 5 shows that there is sign of leaking in the ceiling and figure 6 is the small home on the wall.

Maintenance management system in this building still need some improvement for the maintenance aspect in this museum. Maintenance of building is very important for the building to keep living for the long live span. The maintenance management in this museum also needs to focus on the maintenance work because this building is one of the heritages building in Malaysia. So the lack of staff for maintenance in this building will make the maintenance work will be postponed and it can make the maintenance management for this building is not effective to be adapted in heritage building.

Overall, the Penang State Museum and Art Gallery has more maintenance problem rather than Museum of Perak. Other than that, these two building have several weaknesses from the administration such as management of their staff that can be improved for their maintenance management system.

4. Data Analysis

This part will discuss on data analysis for maintenance management for heritage museum obtained from interview with the staff and observation. The data analysis will be discussed according to these two building that are Penang State Museum and Art Gallery and Museum of Perak. There are several important factors in maintenance management system for heritage museum which are:

i. Worker's skill

Worker's skill also is the most significant for maintenance management system for heritage museum. Every work that is done by the selected contractor must be skilled and very wide knowledge in maintenance work for heritage museum. This is because the maintenance work for heritage museum needs the special skilled for repairing the structural parts of the building so that it will not fade the heritage value in the building [8].

ii. Quality of work

In maintenance management system for heritage museum, the quality of work is the most essential in maintenance of building. This is because the public and visitors to the building can judge the building maintenance according to the quality of work especially for the heritage building that is very precious in each every element of the building. If the quality of work for the heritage building is very poor and low, the building will face the problem of maintenance and can make the building lost the heritage value in the future.

iii. Cost of maintenance (maintenance budget)

The budget of maintenance work that is provided by the federal and state government to the museum is not enough to cover the cost of maintenance work rather than the needed of maintenance of the building. Every year the age of building will increase, so the problem of maintenance in the building also will increase too. The budget for maintenance is very important because the material that is used for heritage building is the special material. Then, the budget for maintenance can also reduce the maintenance problem in the building in order to make the best maintenance work for heritage building [9].

From the interview and observation, there several problems that usually occurs during the process of maintenance.

iv. Budget

Usually the budget problem is the most critical issue in maintenance management system for heritage building. This is because if there is the maintenance problem in the museum building, the administration of the museum needs to apply the cost for repairing the maintenance work one year earlier. So if they do not have the money to make the maintenance work, it will be the biggest problem to further the repairing work [10].

v. Lack of training for the staff.

According to the problem, the less training for the staff also will affect the maintenance management system for heritage building. This is because, if the staff is not very knowledge about maintenance, so they cannot do anything about maintenance management system in the building [11].

There are few factors that cause of maintenance for the heritage museum including:

i. Human weakness

Human also makes the mistake, there are not perfect. From the analysis human is one of the factors that makes the maintenance is needed for the building such as contractor. The contractor's weaknesses to build the building by following the right standard or guide line that is provided by government will give the great

impact to the quality of the building either for long term or short term in future. Then, choose the wrong material [12].

There are many factors that can determine the choosing of the material for the building especially for the heritage building. The selecting of material must be right because it can reduce the defect to the building. The using of new material that is not proof the quality and durability of the material must be avoided because the selecting of the new material according to the research and the previous use of material for the building [13].

ii. Nature

The nature also plays the significant role in determining the maintenance work that will be done especially to the part of building that is exposed to the nature such as sun lighting. The absorption of sun lighting depends on the material that is used toward the building. The absorption of sun lighting also will give the material of building to get the defect [14].

Then, the temperature also can make defects to the building. Many materials that is used for the construction will face the thermal expansion problem that will make the building defect to the material of building. Lastly, the humidity from the ground water and rain water will give effect to the material of the building [15].

4. Conclusion

This paper has presented about the maintenance management system for the heritage museum that including the two heritage museum in Malaysia. Maintenance management is very important for every building especially the heritage building. Heritage museum always have the visitors that come to visit the display in this building such as culture in our country. For these cases, the heritage museum must need a good maintenance management system because it can manage the maintenance in the building systematically and can prevent the damages to the building. The administration for the building also must establish a maintenance department because it can handle the maintenance problem with their own skilled

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